BMVA News

BMVA News[1] is published every three months. Contributions on any activity related to machine vision or pattern recognition are eagerly sought. These could include reports on technical activities such as conferences, workshops or other meetings. Items of timely or topical interest are also particularly welcome; these might include details of funding initiatives, programmatic reports from ongoing projects and standards activities. Items for the next edition should reach the editor by 1 September 2003.

Contents

[1] The British Machine Vision Association and Society for Pattern Recognition is a Company limited by guarantee, No. 2543446, registered in England and Wales. Registered Office: Granta Lodge, 71 Graham Road, Malvern, WR14 2JS. The Association is a non-profit-making body and is registered as charity No. 1002307.

Editorial: *The Season of Assessment*

Most if not all universities in the UK will by now have completed their annual examination marking stints. Herculean efforts will have been expended in ensuring fairness, and the whole exercise will in some cases have been bolstered up by viva voce examinations. Some would say that these schemes, far from being fair, are inaccurate and unreliable, because of the subjective judgements of the examiners. In fact, while the examination marks themselves may well be accurate within very few percent, it is the projects that are subject to the most error and to the differing expectations of different markers. This is because they are normally the most variable aspect of the university assessment system, not least because they are necessarily individual.

Exactly the same situation exists for papers submitted to conferences. Quality apart, they are as dissimilar as chalk and cheese, because the topics and the methods of finding solutions to practical problems are bound to vary enormously. Quality too must be judged, and here there is a need to assess papers in their own terms, but more important for a conference, they must be judged against each other, as time and space dictate that only a limited number can be accepted.

In many ways the ideal method of assessment is that of ranking—for who cares about the marks when an exact order of merit is known? This is obvious when quality alone is concerned, but still applies when chalk and cheese are compared too. However, there is one caveat: that different people will rank chalk and cheese in different ways. Maybe an individual will be consistent in his judgement, but adding the ranks of different individuals (or applying some other simple combination rule) will be neither consistent nor even meaningful. Hence the rank-ordering schema is deeply flawed. On the other hand, so is any marking scheme that allots a single number to a multi-variable quantity. In fact, we are stuck. Just as we are stuck regarding university assessment: nobody likes examinations, but what other way is there? (Of course, many are now trying to eliminate marks in favour of profiles, and with some justification, but this solution will hardly work when it comes to selecting papers for a conference!)

One other factor has also been relevant on this occasion: that Area Chairs were used for the first time to help collate the ranks produced by the individual referees.[2] To me this process revealed all too clearly that one needed more information to achieve the best possible assessment. Thus some 'absolute' judgements seemed to be required to form anchor points and help give meaning to the results. How this should best be done is not very clear, but categories of marks, including (of course) quality, inventiveness, incisiveness, tutorial value, and a good many others are obviously relevant.

Be all this as it may, my job as Newsletter Editor is less to enunciate final solutions than to stir people into action, and try to get them to write in, either to me or to the organisers of this event. We must go on making improvements in the interests both of fairness to authors and of commitment to a quality conference. But the bottom line is that the system is now an open one, as you will see on reading Richard Harvey's valuable article on pp. 4–5 of this issue. Thanks, Richard, a bold step, but I wonder that you may have ushered in more change than you think!

Professor Roy Davies
Editor, BMVA News
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[2]It is relevant to note that Area Chairs were intended to focus more on discriminating between referees' judgements than on going back to the submitted papers and acting as additional referees.

Document and Text Recognition in Images and Video Sequences

Document Analysis and Text Recognition facilitate intelligent interactions at the interface between the physical and virtual worlds. Historically, effort focused upon the exploitation of constrained scanning applications where the document media is under physical control. Traditional application areas include automated postal delivery, digital achieving, digital workflow, digital copy enhancement and intelligent personal scanning. Text analysis is also an important component technology in many industrial applications.

The last few years have witnessed the miniaturisation of the visual sensor leading to a substantial increase in the use of small digital cameras, web-cams and camera-enabled mobile devices such as PDAs and mobile phones. This widespread use places enormous demands on intelligent processing of such streams of data but raises the possibility for a number of new and exciting application areas including the point-and-click scanning of text, capturing and extracting text for storing, communicating or translating notices, billboards, shop-signs, transforming text to audio for the visually-impaired, for navigation by reading road signs, and many more.

The presentations at this meeting covered a broad range of applications in the area of text and document capture. Stephen Pollard (Hewlett Packard Research Labs, Bristol) identified barriers to the adoption of digital camera based technology for the capture of high-resolution text documents, amongst them framing, perspective skew, page curl, illumination and document specularity. He showed how a wide variety of computer vision problems need to be overcome to address these issues and presented some simple solutions to a number of these problems in isolation culminating in a demonstration system that allows text capture using a PDA with an embedded camera as part of a translation process.

Majid Mirmehdi (University of Bristol) discussed in detail the problems of locating and recovering perspective views of text in general scenes. He presented a neural network for scene analysis that combines five low-level image metrics to identify paragraphs of text that is robust to scale and skew. Once located, vanishing point information is recovered from the paragraph structure to correct for perspective skew. The horizontal vanishing point is determined using a novel generalisation of the common 2D projection profile method that

explores whole projection space using a coarse to fine strategy. Following further analysis, lines of text are segmented based upon the style of justification of the paragraphs. The change in line spacing exhibited due to perspective is then used to locate the document's vertical vanishing point and allow planar image correction.

The problem of combining more than one classifier to exploit the complementarity of their advantages and overcome their individual disadvantages was discussed by Sanaul Hoque (University of Kent). He described an approach using a Genetic Algorithm to optimise the structure and parameters of various multi-classifier systems for printed and hand written text recognition. He presented a number of cross-validation experiments performed on a series of practical tasks of increasing complexity drawn from well-known hand-written character databases.

The other two technical papers looked in very different ways at situations where character recognition becomes difficult for traditional character recognition systems. In the first Simon Lucas (University of Essex) explored the problem of text recognition in noisy images typified by the task of reading the year field of a large batch of museum archive cards. The solution he presented was based on over segmentation to achieve robustness and priority-queue based search to regain performance. At the core of the technique was a classifier based on optimal binarisation that was applied at each horizontal location along pre-segmented rows.

Apostolos Antonacopoulos (University of Liverpool) presented an approach to text extraction from web images. Contrary to expectation a considerable percentage of apparent textual information on web pages is embedded in low resolution bitmap graphics. What is more, web designers confound the problem of text extraction by going out of their way to ensure that the imagery is as visually exciting as possible. Apostolos presented a component segmentation and merging scheme based upon fuzzy logic that was able to piece together text glyphs in complex web imagery.

Finally, Simon Lucas made a second presentation on the ICDAR 2003 Robust Reading Competition (http://algoval.essex.ac.uk/icdar /RobustReading.html). This contest has four parts: text location in complex scenes, word recognition, character recognition and an overall robust reading competition incorporating all three of the previous components. For the word and character competitions the relevant text has been neatly cropped but is still presented on its complex background. Trial data sets were made available to entrants but the final evaluation was performed blind using an XML formatted document to communicate the results of each algorithm in a standard form. As with the technical meeting itself the turn out for the competition was less than one would hope for with only a handful of entrants for the text location competition and no entrants for the others. It is clear that while text processing is far from a done deal and areas of application abound, interest in this field amongst the academic community, especially in the UK, is definitely on the decline.

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2nd Edition of Book on Morphology

We are pleased to hear that Pierre Soille's book *Morphological Image Analysis: Principles and Applications* has now been released in a significantly enlarged second edition. Readers of BMVA News will have seen that the first edition was recently very positively reviewed, and it is especially fitting that a second edition has been published already, as the subject has advanced significantly over the past 3–4 years.

For further details of the book see the following websites:

http://www.springer.de/cgi/svcat /search_book.pl?isbn=3-540-42988-3
http://ams.jrc.it/soille/book2nd

Professor Roy Davies
Editor, BMVA News
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A view of Norwich, where BMVC 2003 will be held.

News about BMVC 2003

This year's British Machine Vision Conference will be held in Norwich from 9–11 September. The acceptance results were announced in early June and the final camera ready copy is due by 11 July. There were 173 submissions of which 162 went forward for review. Of these 37 were selected for oral presentation, 46 for posters and 79 were rejected giving an acceptance ratio of roughly 50%. There were many papers above the acceptance threshold but there is a space limit imposed by the proceedings. There are inevitably some tough decisions so it may be of interest to know what happens during BMVC reviewing.

Each paper received three reviews and this year there were 35 referees which meant that each referee had roughly 14 reviews. Compared to other conferences this is a large number of reviews (each submission is 10 pages long so there are 140 pages of material for each referee to handle) but the advantage is that each referee is likely to see a representative sample of papers (more on this later). Each referee is asked to summarise the paper and provide a detailed review. Since these are conference submissions we expect papers to be submitted very close to their final version so inevitably reviews are shorter than for a journal submission. Nevertheless the longest review ran to several pages. The reviewers are also asked to score the paper for Clarity, Suitability, Theory and Validation and this information, along with the review, is passed back to the authors. Additionally

reviewers are asked to rank the papers and it is this ranking which forms the basis for selection.

BMVC uses a robust ranking procedure, known as RAvNR, that has been derived over many years and will be known to many readers of this newsletter. This time the Programme Committee used an adjustment that took account of the confidence of the individual reviewers. Professor Chris Taylor, who has devised the system writes: "Ranks are preferred to absolute quality scores, since it is notoriously difficult to ensure that different reviewers are calibrated similarly, whereas ranking is self-calibrating. The referees' ranks are normalised, to place each referee on an equal footing, and combined into an overall quality score using a robust scheme to down-weight the influence of outliers. This allows a "common sense" global ordering of the papers. The agreement score summarises the extent to which one or more of the referees is "overruled" by the others in the robust combination scheme. The formulae also allow referees' confidence in each review to be taken into account."

If M_p^r is the raw rank given to paper p by referee r and c_p^r is the associated confidence then the normalised rank (out of 100) is

$$N_p^r = 100 \frac{M_p^r - \min_p(M_p^r) + \frac{1}{2}}{\max_p(M_p^r) - \min_p(M_p^r) + 1} \quad (1)$$

The agreement, α_p^{rs} is a number in $(0,1)$ indicating the agreement between the between two referees r and s and is modelled as Gaussian so that

$$\alpha_p^{rs} = \exp\left(\frac{-(N_p^r - N_p^s)^2}{2\sigma^2}\right) \quad (2)$$

where $\sigma = 25$ gives a sensible trade-off between robustness and sensitivity. The overall agreement

between referee r and all the other referees is defined as

$$a_p^r = \frac{\sum_{s \in \mathbf{R}_p, s \neq r} c_p^s \alpha_p^{rs}}{\sum_{s \in \mathbf{R}_p, s \neq r} c_p^s} \quad (3)$$

where $\mathbf{R}_p$ is the set of referees for paper p. These formulae can then be used to derive the numbers used are use as inputs to the Programme Committee meeting:

$$\hat{N}_p = \frac{\sum_{r \in \mathbf{R}_p} c_p^r a_p^r N_p^r}{\sum_{r \in \mathbf{R}_p} c_p^r a_p^r} \quad (4)$$

which is the RaVNR or Robust Average Normalised Rank and the referee agreement score:

$$A_p = \frac{\sum_{r \in \mathbf{R}_p} c_p^r a_p^r}{\sum_{r \in \mathbf{R}_p} c_p^r} \quad (5)$$

At the BMVC 2003 review meeting 21 papers had low agreement scores and were flagged for special consideration. Special consideration is also given to any potentially rejected paper that has any review from any referee with a normalised rank in the upper quartile or any potentially accepted paper with a normalised rank in the lower quartile. The top-ranked paper had a RAvNR of 6.8; the lowest ranked paper had a RAvNR of 96.9.

Normal practice for BMVC is that all referees must attend the review meeting which, as the number of submissions has increased, has become burdensome. This year we introduced an Area Chair system so that attendance was mandatory only for Area Chairs. Each Area Chair was responsible for reviewing the reviews assigned to their papers. This considerably shortened the review meeting and, to some extent, allowed Area Chairs to resolve reviewer disagreements beforehand.

All the reviewing and paper management is handled by the Conference Administration Website or CAWS which is ably administered by Mike Rogers and Gareth Jones at the University of Manchester.

Feedback is always useful so if you have any observations about how the process worked then please email me or any of the BMVA Executive Committee.

We look forward to welcoming you to Norwich where you can engage with the delegates and view the presentations. Here are seven useful facts about BMVC 2003:

- The invited speakers are Professor David Forsyth (University of California, Berkeley) http://www.cs.berkeley.edu/daf/ and Prof. Ulf Grenander http://www.dam.brown.edu /pattern/ug.html (Brown University).

- The tutorial this year will be on the subject of Pattern Recognition and will be taught by Dr Andrew R. Webb from Qinetiq (details of his book are at http: //www.statistical-pattern-recognition.net/).

- Wednesday is industry day and the Imaging Faraday Partnership are running an industry seminar for invited guests.

- So far the sponsor list includes Microsoft Research, Vision System Design Magazine, Segmentis Ltd and the City of Norwich.

- The prizes are sponsored by the BMVA, CRS Limited and Image Metrics Ltd with, we hope, more sponsors to follow.

- We hope to have Wi-Fi access throughout the conference venue.

- An exhibition entitled "Computer Vision and Art" will run concurrently with the conference: contact Professor Andrew Bangham (`ab@sys.uea.ac.uk`) for further details.

Registration will open soon at the BMVC 2003 website (www.sys.uea.ac.uk/bmvc2003)—don't forget to register early and receive the early-bird registration rate.

Dr Richard Harvey
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European Machine Vision Association (EMVA) founded

The European Machine Vision Business Conference, held in Barcelona on Friday 23 and Saturday 24 May 2003, truly marked a turning point in the Machine Vision industry. For the first time, about 60 Machine Vision Chief Executives, experts and analysts met to exchange market intelligence, news of innovative technologies developed in Europe, and to establish a new network: The European Machine Vision Association (EMVA).

For further information on EMVA and its recent conference, see www.emva.org or email Manfred Hock, who is a main contact point.

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VDMA Machine Vision
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Medical Image Understanding and Analysis 2003 (MIUA 2003)

10-11 July 2003 The University of Sheffield

7th Annual Meeting in the Series

MIUA is designed to provide a UK forum for the dissemination and discussion of research in medical image understanding and analysis, an expanding area in which significant advances are currently being made. The meeting aims to encourage the use of image understanding and analysis in clinical practice as well as research, bringing together the various scientific and medical communities working in this area.

The meeting is co-sponsored by the foremost professional organisations in the area, including the British Machine Vision Association (BMVA), the British Institute of Radiology (BIR) and the Institute of Physics and Engineering in Medicine (IPEM).

There will be seven oral sessions covering the following areas:

Thursday 10 July

- Image Models
- Classification
- Image Registration
- Morphology

Friday 11 July

- MR Developments
- Segmentation
- Motion and Reconstruction

and two sessions devoted to posters.

A full programme of all the papers being presented, both oral and poster, can be found at www.miua.org.uk along with details on electronic registration.

The registration fee is £150 for members of the sponsoring organisations (BMVA, IPEM and BIR) and £170 for non-members. There is a reduced fee for student presenters. En-suite accommodation is at Stephenson Hall (£36 B&B per night).

The conference fee includes a copy of the conference proceedings, all meals during the day and the conference dinner at Hassop Hall, Derbyshire on 10th July.

For further details visit the above web-site, or contact David.Barber@dth.nhs.uk. To receive additional information about MIUA 2003 as it becomes available join the MIUA email list by sending to jiscmail@jiscmail.ac.uk the following command as the only text in the body of a message:

join miua <firstname> <lastname>

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Second call—expression of interest for hosting BMVC 2005

The BMVA Executive Committee wishes to make a second call for expressions of interest to host BMVC 2005. Please respond to the Secretary of the Committee, Dave Marshall, as soon as possible and in any case by the final deadline of 31 July 2003.

Dr David Marshall
University of Cardiff
email: `dave.marshall@cs.cardiff.ac.uk`

Call for Participation: Meeting on Advancing Biometric Technologies

This one-day BMVA symposium will be held at the Royal Statistical Society, 12 Errol Street, London, during November 2003. The purpose of this workshop is to bring together researchers interested in the advances and applications of colour science on computer vision and image processing.

If you are interested in participating, please send a 200-word abstract to Professor Ronnier Luo by 1 August.

Professor Ronnier Luo
University of Derby
email: `m.r.luo@derby.ac.uk`

Message from the IAPR

Dear BMVA member,

As one of the BMVA representatives to the governing board of IAPR, I was asked to circulate to all BMVA members the following message from the Executive Committee of IAPR. Please send your replies to me by 31 July, marked 'VOTE' at the address petrou@iti.gr

Thank you very much,
Maria Petrou

Dear IAPR members,[3]

The IAPR Newsletter is the official publication of the International Association for Pattern Recognition, published four times per year to keep IAPR members updated on IAPR activities. Each individual member of the IAPR is entitled to receive his/her own copy of the Newsletter, either directly mailed from the printer, for Member Societies that opted for individual mailing, or redistributed within the Member Society, for Member Societies that opted for bulk mailing from the printer. In the former case, Member Societies have to pay the difference between the individual and bulk mailing to IAPR, when paying IAPR dues. In the latter case, Member Societies will have to cover the expenses for distribution of all copies received in bulk to individual members. In both cases, distribution of the Newsletter to individual members has a cost for Member Societies.

To give you an idea of what an electronic version of the newsletter could be, we have set up a web site open to all IAPR individual members (a simple registration is necessary), where the two last issues of the newsletter can currently be found. The web site, kindly hosted by the CEDAR, can be found at the following address: http://www.cedar.buffalo.edu/IAPR/ In the future, this members-only web site may also provide other useful information to all the association's members.

There are motivations to support both paper and electronic version:

Advantages of paper version

- The Newsletter in paper version reaches our individuals ready to read and does not require extra effort to print it from our computer; it is portable and hence readable in any place; it is a tangible sign of IAPR membership.
- Newsletter in electronic form risks to be classified by receivers as junk mail and, as such, directly sent to trash (or, more optimistically, classified as non-urgent mail and its reading indefinitely postponed).

Advantages of electronic version

- Notification done by email is timely: the members would be informed through email whenever a new newsletter issue becomes available in electronic form. This is a very quick and efficient process, whereas the print version often takes several weeks, or longer, to reach individuals, not only due to mail delays, but also to the time taken by individual societies to distribute it.
- Electronic version is a bit cheaper for Member Societies, as they would save the postal expenses for internal distribution to individuals; colour pictures can be always included
- Newsletter in paper form is quite expensive for IAPR (IAPR covers the expenses for printing, as well as the for bulk distribution). The money saved in this way could be used for other aspects of IAPR policy: support to technical committees, more travel stipends to the ICPR, enhanced digital library services, etc.

To help the IAPR Governing Board come up with the best solution at its next meeting, we would like you to fill out the included voting form and send it back to the representative named by your society. Each member society of the IAPR will report back to the executive committee with a summary of the votes received.

Voting Form

Please fill in and send back to petrou@iti.gr by 31 July 2003.

I prefer the IAPR Newsletter in paper form/postal distribution.
or
I prefer the IAPR Newsletter in electronic form/email notification.

Comments:

Member's name and date:

Professor Maria Petrou
University of Surrey
email: `petrou@iti.gr`

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[3]Note that all paid-up Members of the BMVA are automatically members of the IAPR—Ed.

17th International Conference On Pattern Recognition

Call for Papers

The 17th International Conference on Pattern Recognition is hosted by the British Machine Vision Association (BMVA) and will be held in Cambridge, UK, on 23–26 August 2004. The conference website is: http://www.ee.surrey.ac.uk/icpr2004/

ICPR 2004 is the 17th conference of the International Association for Pattern Recognition (IAPR). Started in 1973, ICPR is a major biennial event, aiming to stimulate research, development, and the application of pattern recognition, and to advance international co- operation in related disciplines.

The ICPR 2004 Theme is "Pattern Recognition in the Digital World". The conference will provide an international forum for discussions on recent advances in the fields of:

- Computer Vision And Robotics
- Pattern Recognition
- Neural Networks
- Image And Signal Processing
- Architectures, Technology And Tools For Pattern Recognition And Image Processing
- Applications
  - Biomedical, Biometrics, Multimedia,
  - Document Analysis, Remote Sensing,
  - Industrial Automation, E-Commerce, ...

The conference programme will be organised into five tracks. For a detailed list of topics and the paper submission procedure, please visit http://www.ee.surrey.ac.uk/icpr2004/

ICPR 2004 will take place in Cambridge, in the heart of the UK. In addition to the technical program, participants can also enjoy the City with its culture and old English tradition. This historic City with its world-renowned University is within easy travelling distance from the main international airports in London and is extremely well-served by rail and coach services.

Cambridge can boast of ancient monuments, a wealth of museums and galleries, as well as its famous book-shops and markets. Visitors should walk along the famous grass-covered banks of the River Cam or take a lazy summer punt along the river and enjoy the architectural glories of the riverside colleges.

The best known of all Cambridge buildings is Kings College Chapel, with its world-famous choir.

Important Dates

Full paper submissions due: 15 December 2003 Notification of acceptances: 15 April 2004 Final camera-ready papers due: 15 May 2004

The paper page limit is four pages. Anonymous papers should be written in English and submitted in pdf format. Formatting instructions provided by the IEEE Computer Society Press will be available soon from the ICPR 2004 conference website.

Registration

Information on registration for the conference will be posted on the conference website in due course: http://www.ee.surrey.ac.uk/icpr04/

Technical Programme Committee

General Programme Committee Chair: Maria Petrou, University of Surrey, UK

Track One: Computer Vision. **Chairs**: Edwin Hancock, University of York, UK Mike Brady, University of Oxford, UK with Associated Theme: Machine Vision Applications Yuichi Ohta, University of Tsukuba, Japan

Track Two: Pattern Recognition and Neural Networks with Associated Theme: Document Analysis. **Chairs**: Anil K Jain, Michigan State University, USA Horst Bunke, University of Bern, Switzerland

Track Three: Image and Signal Processing with Associated Theme: Medical Applications. **Chairs**: Josef Bigun, University of Halmstad, Sweden Vaclav Hlavac, Czech Technical University, Prague, Czech Republic Chris Taylor, University of Manchester, UK

Track Four: Multimedia Systems with Associated Theme: Image and Video Database Retrieval. **Chairs**: Thomas Huang, University of Urbana, Champagne, USA Alberto Del Bimbo, University of Florence, Italy Ruud Bolle, IBM, USA

Track Five: Architectures, Technology and Tools. **Chairs**: Virginio Cantoni, University of Pavia, Italy Markus Vincze, Vienna University of Technology, Austria

Organising Committee

General Chair: Josef Kittler, University of Surrey, UK
Technical Chair: Maria Petrou, University of Surrey, UK
Conference Manager: Rachel Gartshore, University of Surrey, UK

Tutorials Chair: Richard Harvey, University of East Anglia, UK

Satellite Workshops Chair: Andrew Fitzgibbon, University of Oxford, UK

Publications Chair: Mark Nixon, University of Southampton, UK

Publicity and Sponsorship Chair: Majid Mirmehdi, University of Bristol, UK

Demos Chair: Adrian Clark, University of Essex, UK

17th International Conference on Pattern Recognition "Pattern Recognition in the Digital World" http://www.ee.surrey.ac.uk/icpr04/

Majid Mirmehdi
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email: `m.mirmehdi@cs.bris.ac.uk`

Nominations for BMVA Executive Committee

BMVA
British Machine Vision Association and Society for Pattern Recognition

Nominations are requested for the forthcoming election of Executive Committee members of the BMVA. Nominees must be paidup members of the Association and agree to serve for a period of two years. A member of the Committee is expected to participate in the bimonthly committee meetings normally taking place in Oxford. Regrettably BMVA does not cover the travel expenses of the members participating in the committee meetings.

Completed nomination forms should be sent to the BMVA Secretary at the address below and must be received by 31 July 2003. This request for nomination must be signed by the individual standing and one other member. The nomination should also include a brief biographical statement for distribution to BMVA members.

The elected committee consists of 10 elected members, five of whom are elected each year. The members elected in 2001, who will stand down this year are:

Prof. Maria Petrou
Prof. Roy Davies
Prof. Tim Ellis
Dr. Charles Taylor
Dr. Richard Bowden

If more than five nominations are received for the five elected places then a postal ballot will be held. Voting papers will be sent out in early August and will need to be returned by 5 September. Each member will be able to vote for up to five candidates. The results will be announced at BMVC 2003 at the University of East Anglia in Norwich and in BMVA News.

Dr David Marshall
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BMVA mailbase

The BMVA executive committee asked me to email our current members to remind them of the BMVA mailbase. If you are not already subscribed to the mailbase simply follow this link http://www.jiscmail.ac.uk/lists/bmva.html, click on 'join' and enter your email.

The BMVA mailing list is a moderated (no spam) list which we use to publicise meetings and communicate quickly with our membership. We deliberately keep posts to a minimum so when you get a BMVA mail you know it's important.

If you are not already a member, we encourage you to join today.

Richard Bowden
University of Surrey
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Book Review—Hartley and Zisserman

Richard Hartley and Andrew Zisserman, *Multiple View Geometry in Computer Vision*, Cambridge University Press, 2002, ISBN: 0-521-62304-9, hardback, xvi + 607 pp.

This book provides a comprehensive coverage of projective geometric computer vision. Much of the material in the book appears to come directly from papers published over the previous decade by the authors, and the structure tends to follow the direction of the research over that period, but it may not be dismissed as merely a republished collection

of papers. It provides a concise, well-presented and well-supported coverage of a whole field of research through its progression from calibration of a single camera to reconstruction of structure from multiple views.

The book is divided into five parts. Following some background reading, the main sections of the book progress from single view geometry in Part 1, through two and three view geometry, to *n*-view geometry in Part 4. Each section contains an introduction and conclusion and could almost be read as a self-contained volume.

Labelled "Part 0" to indicate background reading, the first section of the book provides an introduction to the projective geometry of 2D and 3D including representation of the geometry and basic methods of manipulation and estimation. It also explains how the geometry relates to the objectives of geometric computer vision and provides a brief introduction to methods for algorithm evaluation. In four chapters it imparts the basic knowledge commonly provided in this type of text to make it accessible to students and researchers entering the field. Prior to the publication of this book I would have recommended *Three Dimensional Computer Vision: A Geometric Viewpoint*, Faugeras (1993) to be the best introduction to geometric computing and projective geometry before beginning on more recent texts. This background section prevents the need for a separate book.

Part 1 consists of three chapters introducing single view geometry. These cover camera models, camera calibration through point or line correspondences, and the effect of projective transforms on 3D entities such as lines, planes, conics and quadrics. Essentially this is another topic of background reading, provided to support the later sections. It is brief in comparison with the coverage of camera calibration in other texts but provides a good introduction with plenty of figures, suitable for a reader new to the subject.

The geometry of two perspective views, commonly referred to as stereo vision, is introduced in Part 2. This is the largest single subject covered within the book as it provides the basic theory of all the multiple view methods. It consists of five chapters covering basic epipolar geometry, fundamental matrix estimation, triangulation methods, the geometry of planes in perspective views and geometry reconstruction. Also included in this section is a chapter on the use of the affine camera model in two-view geometry and its advantages and disadvantages in practical situations. These chapters provide a thorough coverage of all the important topics in two-view geometry. Part 3

consists of two chapters that expand from two-view to three-view geometry. One chapter introduces the trifocal tensor and its supporting theory while the other demonstrates methods of computation from point and line correspondences.

The final six chapters of Part 4 contain a wealth of newer material and results from the field of multiple view geometry. Beginning by presenting a more general framework for the two-view and three-view geometry, this section extends the framework to encompass the theory of *n*-view geometry and algorithms for reconstructing geometric structure from multiple views. Other topics in this final section include camera auto-calibration, geometry that will cause the algorithms to fail and how to determine if points are in front or behind the camera. These are practical topics that are required if you intend to implement a multiple view system.

Overall, this book provides a clear explanation of some difficult concepts and an introduction to the mathematical equations required to use them. It presents both the theory and resulting algorithms in a style which makes them easy to understand and implement. It is well laid out, easy to navigate for reference, provides good examples (although a few more may be useful) and helpful notes and exercises at the end of each chapter.

Although I am reviewing this book some time after the original date of publication, I have been using it regularly for reference for almost two years and wish it had been available when I first studied computer vision. There are several alternative texts that may be used as an introduction to multiple view geometry, but this one stands out with its clear approach and explanations as being ideal for both teaching and reference for any researcher in the field.

Martin Lewin
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Book currently under review

J.-L. Starck and F. Murtagh *Astronomical Image and Data Analysis*, Springer, 2002, ISBN 3-540-42885-2, hardback , xi + 289 pp. (Dr Anthony Cook)

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